

CLAIMS

1. An optical projection exposure device for imprinting a circuit pattern, or the like, on a printed circuit board, comprising:

a photo mask having a prescribed pattern,

projection means for projecting said photo mask pattern onto said board,

a light source device for irradiating exposure rays through said projection means for imprinting said photo mask pattern on said board, and

an optical magnification adjustment system installed in between said photo mask and said board for correcting the magnification of said pattern in at least one arbitrary direction.

2. The device of claim 1 wherein:

said optical magnification adjustment system has a first plano-convex or plano-concave lens with an optical power $\phi 2$, as defined by the equation below, and a second concave-plano or convex-plano lens with an optical power $\phi 3$, as defined by the equation below, both of which are installed in a telecentric position on the side of an object surface or on the side of an image in an optical exposure system, wherein the total system magnification of said optical exposure system may be minutely varied by changing the space between said lenses,

$$\phi 3 = -\Phi(S1 + e1)/d0$$

$$\phi 2 = (\Phi - \phi 3)/(1 - d0 \phi 3)$$

where, Φ : Total optical power of said optical magnification adjustment system,

S1: Distance from the first surface of said first lens to said object surface (i.e., photo mask surface),

d0: Center space of said two lenses, that satisfies a magnification $\beta = 1$,

$e1 = t1 / n1$ (t1: Center thickness of said first lens 1, n1: Refraction index of said first lens 1).

3. The device of claim 2 wherein:

said optical exposure system has its optical aberrations corrected in advance according to its purpose in a condition where parallel planes of their total thickness equal to the total central thicknesses of said two lenses are inserted.

4. The device of claim 2 wherein:

said two lenses are cylindrical lenses.

5. The device of claim 2 wherein:

each of Abbe numbers $\nu 1$ and $\nu 2$ of said two lenses is set to satisfy the following equation,

$$\nu 1 / \nu 2 \approx \phi 2 / \phi 3.$$

6. The device of claim 1 wherein:

said optical magnification adjustment system corrects said magnification in at least one direction, longitudinally or laterally of a board.

7. The device of claim 1 wherein:

said optical magnification adjustment system has at least one cylindrical lens.

8. The device of claim 1 wherein:

said optical magnification adjustment system has parallel planes which are bent in accordance with a curve of secondary degree.

9. The device of claim 1 wherein:

said optical magnification adjustment system has one of a cylindrical lens or a parallel plane bent according to a curve of secondary degree for correcting magnification in one direction, and one of another cylindrical lens or another parallel plane bent according to a curve of secondary degree for correcting magnification in the direction perpendicular to said one direction.

10. The device of claim 1 wherein:

said optical magnification adjustment system is a telecentric optical system.